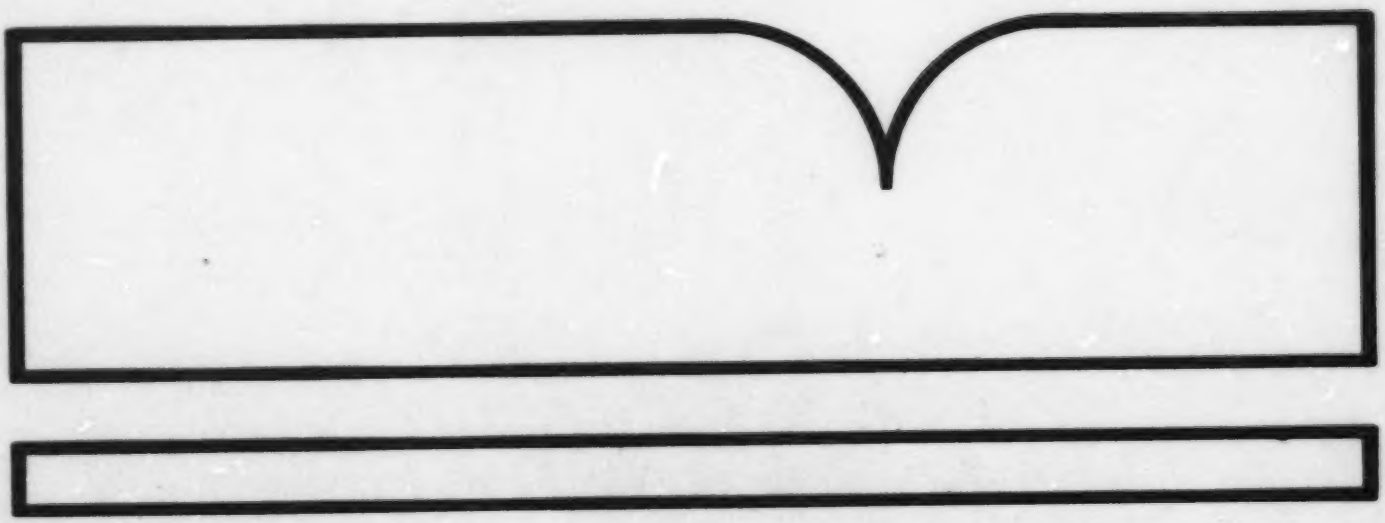
PB81-153827

Evaluation of the Hydro-Catalyst Corporation Pre-Combustion Catalyst

(U.S.) Environmental Protection Agency
Ann Arbor, MI

Jul 73



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NTIS.

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completin

1. REPORT NO.	2.	3. R PB81-153827
EPA-AA-TEB-74-4		

4. TITLE AND SUBTITLE	5. REPORT DATE
Evaluation of the Hydro-Catalyst Corporation Pre-Combustion Catalyst	July 1973
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Environmental Protection Agency Office of Mobile Source Air Pollution Control Test and Evaluation Branch Ann Arbor, Michigan 48105	10. PROGRAM ELEMENT NO.
	11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS Same as 9	13. TYPE OF REPORT AND PERIOD COVERED Technical
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

Hydro-Catalyst Corporation of Colts Neck, New Jersey, contacted the Environmental Protection Agency and requested an evaluation of their pre-combustion catalyst. Data was presented from Scott Laboratories compiled using a 1972 Cadillac Eldorado. The results of this testing illustrated good CO control with possible NOx reduction. An evaluation of this device was initiated by the Test and Evaluation Branch.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Catalysts Exhaust emissions Carbon Monoxide (CO) Nitrogen Oxides (NOx)	Pre-Combustion Catalyst	

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release unlimited	Unclassified	7 p.
	20. SECURITY CLASS *(This page)*	22. PRICE
	Unclassified	

EPA Form 2220-1 (9-73)

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

EPA-AA-TEB 74-4

Evaluation of the Hydro-Catalyst Corporation Pre-Combustion Catalyst

July 1973

Emission Control Technology Division
Office of Air & Water Programs
Environmental Protection Agency

Background

Hydro-Catalyst Corporation of Colts Neck, New Jersey, contacted the Office of Air Programs and requested an evaluation of their pre-combustion catalyst. Data was presented from Scott Laboratories compiled using a 1972 Cadillac Eldorado. The results of this testing illustrated good CO control with possible NOx reduction. An evaluation of this device was initiated by the Test and Evaluation Branch.

Device Description

The Hydro-Catalyst Corporation's pre-combustion catalyst consists of a bowl-shaped, dual-screened element which is fixed in the intake manifold. The screen element is made of a pair of screens of a planar configuration spaced about 1/16" apart. One screen is plated with cadmium and the other with nickel. The element is made as an integral part of the intake manifold/carburetor gasket and is suspended in the flow stream at the intake manifold/carburetor interface.

According to the literature supplied with the device, a catalytic effect on the air/fuel mixture was claimed to have caused and/or initiated precursors that influenced combustion. It was claimed that this precursory effect lowered vehicle octane requirement and allowed for more tolerance to lean carburetion thus affecting a reduction in emissions.

Test Program

Three tests were conducted on a 1972 Cadillac Eldorado equipped with this device, using the 1975 FTP. A 5500-pound vehicle inertia was simulated throughout testing. Tests were conducted with and without EGR, with a capacitive discharge ignition, and with a standard coil.

Test Results

The emission results and carbon balance fuel consumption are presented in the attached table. The bag 1 and bag 2 data from the 1975 FTP results were used to calculate 1972 FTP results. This data shows no significant hydrocarbon or oxides of nitrogen control when compared with typical certification results. Although low levels of carbon monoxide were achieved during this testing it should be noted that choke action was set-up to be very much restrained. Driveability was poor during the cold start portion of testing. Typically one to three false starts were observed and accelerator pumping was required to keep the vehicle running at idle under these conditions.

Between the first two test runs and the last test run there was a large change in NOx, carbon dioxide, and fuel consumption levels. This difference is attributed to tuning performed by the Hydro-Catalyst Corporation's representative. Tuning included cleaning the EGR system and a change in EGR rate and replacement of capacitive discharge ignition with a standard coil system.

Conclusions

1. No significant control of hydrocarbons or oxides of nitrogen was demonstrated by this device.

2. The low levels of carbon monoxide achieved during this testing were probably a function of choke setting.

3. Minimal choke action led to poor cold start driveability.

Table of Results

1975 Test Results
(grams per mile)

Test #	HC	CO	CO_2	NOx	MPG	Comment
1	2.09	6.75	891.07	3.84	9.72	No EGR C.D. Ign.
2	2.47	6.99	936.60	2.79	9.36	EGR,C.D. Ign.
3	3.03	7.29	750.92	5.81	11.48	EGR,Ign,coil

1972 Test Results
(grams per mile)

Test #	HC	CO	CO_2	NOx	MPG	Comment
1	2.56	8.91	930.17	4.05	9.32	No EGR C.D. Ign.
2	3.09	8.63	982.52	2.96	8.82	EGR, C.D. Ign.
3	3.25	8.84	791.90	5.90	10.87	EGR, Ign. coil
	1.9	19.0	~	2.4	8.1	'73 cert.data

Addendum

Test Report 74-4

Evaluation of Hydro-Catalyst
Corporation Pre-Combustion Catalyst
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Subsequent to the evaluation of the pre-combustion catalyst supplied by the Hydro-Catalyst Corporation, routine calibration of the carbon dioxide instrumentation revealed that the instrument was operating inadequately during the evaluation. As a result of this situation the carbon dioxide levels and fuel economy reported are considered to be in error. This calibration problem does not materially effect the conclusions or the other emission data presented in the report.